

FLIGHT

The
AIRCRAFT
ENGINEER
&
AIRSHIPS

First Aero Weekly in the World.

Founder and Editor: STANLEY SPOONER

A Journal devoted to the Interests, Practice, and Progress of Aerial Locomotion and Transport

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DIARY OF FORTHCOMING EVENTS

Club Secretaries and others desirous of announcing the dates of important fixtures are invited to send particulars for inclusion in the following list:

1922.	
Mar. 23	Lecture, "Some Notes on Commercial Aircraft," by S. H. Evans, before Students' Section, R.Ae.S.
Mar. 26-	
April 2	Nice Meeting
Mar. 30	Lecture, "The Design of a Commercial Aeroplane," by Capt. de Havilland, before R.Ae.S.
Mar. 31	Lecture, "Aircraft Design" by H. P. Folland, before I.Ae.E.
April 7	Lecture, "Some Outstanding Problems in Aeronautics," by Professor L. Bairstow, before Students' Section, R.Ae.S.
April 17	R.Ae.C. Race Meeting, at Waddon
April 17-19	Seaplane Contest, Marseilles
June 1	Entries close for Schneider Cup Race
June 5	R.Ae.C. Easter Race Meeting, at Waddon
June 23-25	International Competition for Touring Aeroplanes, Brussels
July 6-20	French Gliding Competition
Aug. 6	Gordon-Bennett Balloon Race, Geneva
Aug. 7	R.Ae.C. Race Meeting, at Waddon
Aug. (last fortnight)	Schneider Cup Seaplane Race, at Naples
Sept.	Tyrrhenian Cup, Italy
Sept.	Italian Grand Prix
Sept. or Oct.	R.Ae.C. Race Meeting, at Waddon
Sept. 22	Coupe Deutsche (300 kil.)

INDEX FOR VOL. XIII.

The Index for Vol. XIII of FLIGHT (January to December, 1921) is now ready, and can be obtained from the Publishers, 36, Great Queen Street, Kingsway, W.C. 2. Price 1s. per copy. (1s. 1d. post free).

EDITORIAL COMMENT



It is now a matter of five years since FLIGHT first condensed the claim for a separate Air Service into the slogan "One Air Service, one Uniform, one Badge," although we had been pressing the claim for such a service for years before that. The Air Service, with its independent Minister, came into being at last, but ever since the R.A.F. and the Air Ministry have been the subjects of attacks from the older Services, who refused to admit the soundness of letting the Air Force develop independently of the Army and Navy. As we were the first to put forward the demand for the establishment of the Air Service as an independent arm, it was with no small satisfaction that we heard the very strong and convincing statement, by Mr. Chamberlain, in the House during the Debate on the Navy Estimates, of the Government attitude towards the forces which are working for the suppression of the R.A.F. and for its division into separate naval and military flying services. There has been a tendency to doubt whether the Government, when pressed for a decision, would resist the claims of the older Services and take up a strong stand in favour of retaining the R.A.F. as an independent force. Mr. Chamberlain's statement cleared the air at once, and set at rest the minds of those who, having the future of the Empire and the R.A.F. at heart, were somewhat doubtful as to the support which the Government would be prepared to give to our new First Line of Defence, which is actually what the R.A.F. is rapidly becoming.

The Navy's claim, as voiced by Rear-Admiral Sir R. Hall, was even less strong than might have been expected, and the gallant Admiral did not succeed in doing more than plead from the peculiarly narrow point of view of the Navy. His arguments were those which the Navy has ever advanced, and he gave an excellent proof of the failure of the naval officer to grasp the real significance of the advent of the Air

Arm. Mr. Chamberlain, in pointing out that all our fighting services exist, and only exist, for the defence of our common country, scored heavily in comparison with the very narrow view taken by Sir R. Hall, who appeared to look at the matter entirely from the naval point of view, as was, of course, only to be expected. All the old arguments about the failure of the necessary co-operation between the Navy and the R.A.F. were trotted up again, and, as usual, it was omitted to point out that this failure has been entirely the fault of the Navy itself. Nor is this surprising when one bears in mind that, as the Navy was out for getting control of its own air service, it was obviously desirable that the present arrangement should show up as badly as possible.

However, Sir Reginald Hall, as a result of the very strong stand taken by Mr. Chamberlain, and realising that the House appreciated the weakness of his case, begged leave to withdraw his motion, and thus it may be supposed that the Admiralty have, for a time at any rate, abandoned the idea of a Naval Air Force, and that the future of the independent Royal Air Force is assured. This is all to the good, and we congratulate the Government on their firm stand, which is, to all but those with vested interests or limited outlook, obviously the right one.

Having, presumably, been finally convinced that, no matter how it tries to pull the strings, it will not get its own Air Service, the Navy may be found in the future to be better disposed to co-operate with the R.A.F., seeing that it has now nothing to gain by refusing co-operation—for we do not believe that the Navy is blind to the possibilities of aircraft—and the appointment of a Committee to look into the better co-operation of the two Services may result in a great deal of good, even if it is not yet possible to establish a Ministry of Defence to co-ordinate the work of all three fighting services.

The Air Estimates

Elsewhere in this issue will be found a brief summary of the Air Estimates for 1922-23, which were published on March 17. The debate on them in the House of Commons is to take place on March 21, but as this is the day on which this journal is at press, it will not be possible to include a report of the debate in this issue. From the summary of the Estimates published this week, it will be seen that a reduction of just over 7½ million as against the current financial year is contemplated, while as regards personnel a reduction of 9,700 is provided for. The revised Estimates for 1921-22 were £18,411,477 and a personnel of 40,880, while the corresponding figures for the current year are £10,895,000 and 31,176 respectively.

We do not propose to deal with the net figures under the various heads in detail this week, but will confine ourselves to a few remarks on the Estimates as a whole. It is true that, faced as we are with the vital necessity of economising in every way possible, reductions have to be made. At the same time, the increasing importance of the R.A.F. is now generally admitted, and its functions are gradually expanding, as instanced by the taking over by the R.A.F. of the control of Iraq. Consequently it was to be expected that the recommendations of the Geddes Committee

would not be carried out in full. Even so, the reductions are considerable, and we do not expect the forthcoming Debate in the House to bring forward any very strong criticism of the total amounts involved, although possibly the manner of their allocation may be open to discussion.

The reduction in expenditure on research of £529,000 is certainly open to adverse criticism. The problems which are still awaiting solution are so many and so important that to reduce the amount spent on research from £1,706,000 to £1,177,000 cannot fail seriously to affect progress. And progress, in the very nature of things, must be rapid in aeronautics, in the fighting Air Force no less than in civil aviation. As far as we are concerned, we cannot agree that to cut down research is anything but a short-sighted policy, and one which we may easily live to regret—some day when it is too late. Research cannot be expected to give immediate results, and now is the time when we should lay the foundation for the work which may prove of inestimable value in the future—at a time, probably, when it will be most urgently needed.

What France is Doing

While on the subject of the Air Estimates, it is not without interest to examine what others are doing, since obviously our policy must be to a large extent governed by the attitude of other countries towards the Air Arm. Nor is there any necessity for going far afield, our neighbour and ally France providing an excellent example of a very strong air policy. At the present time France has something like 160 squadrons on war footing, compared with our 18 or so. By the end of next year she will have about 220 squadrons. France has so encouraged aviation that her output towards the end of last year was in the neighbourhood of 150 machines per month. It is probably not far wrong to estimate the number of machines built in this country since the Armistice at 300.

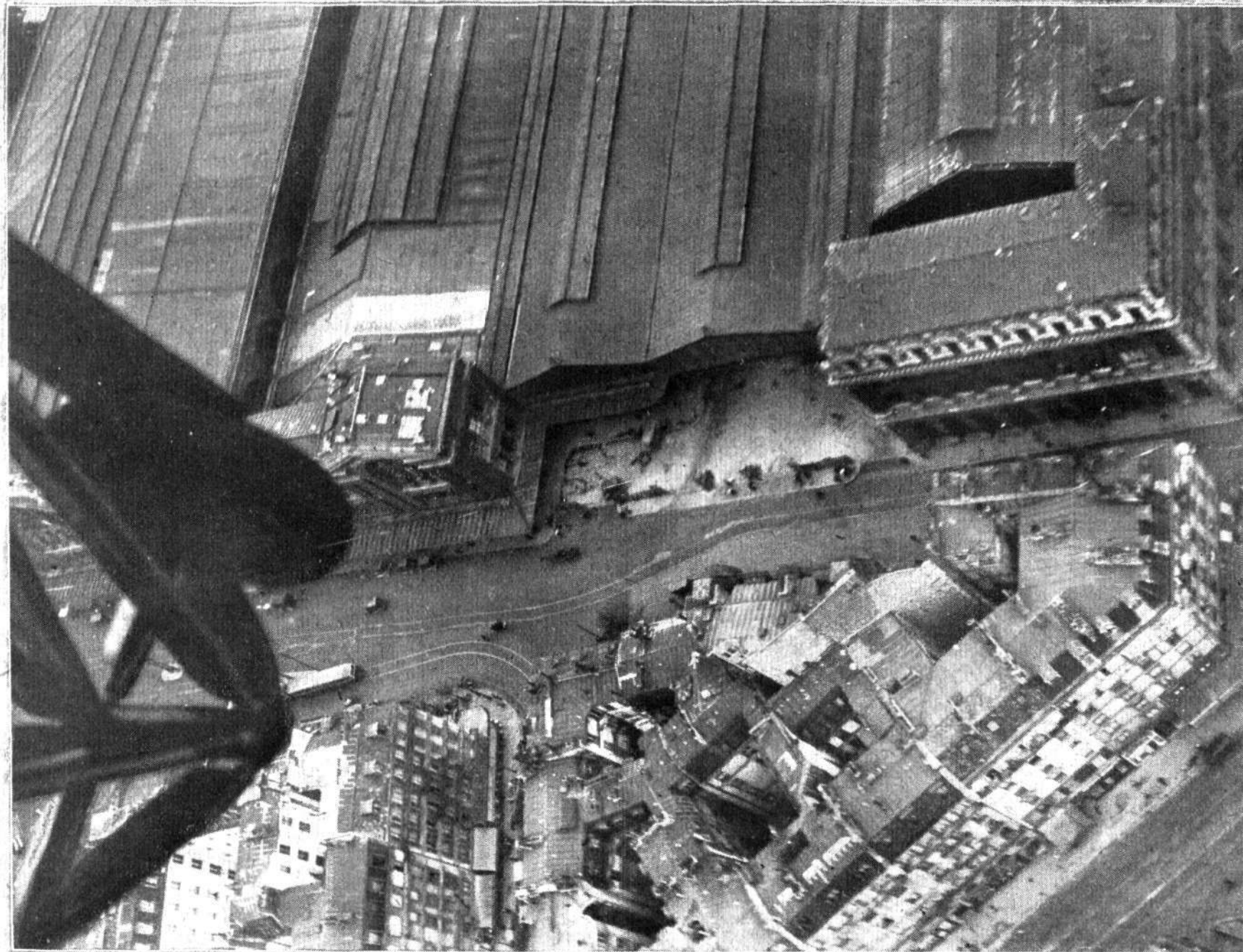
France's expenditure on aviation is about 443 million francs. At par this is equivalent to £17,720,000, and bearing in mind the difference in pay in the two countries, and the fact that in France certain items, such as land and buildings and transport, come under other Votes, this figure is actually more ahead of our 11 million than appears at first sight. French Civil Aviation comes in for about 95 million francs, out of which approximately 45 million francs is allotted for subsidies. Compared with our £880,000, these are formidable figures, and the wisdom of reducing our Civil Aviation Vote by £516,000 may well be questioned.

The series of articles by Brig.-Gen. Groves in *The Times* expresses some very strong views, views which merit the very closest attention. We would urge all who are interested in aviation and in the future of the R.A.F. to read these very carefully. The importance of Civil Aviation to our air power is strongly emphasised in these articles, and we hope to refer to them in more detail next week. At present space does not allow of doing so, nor of dealing with several items in the Air Estimates, which appear to call for comment. With that we must leave it at present.

Italian Parachute Competition

FROM Rome it is reported that the Ministry of War is to organise a competition for parachute descents. First prize is to be of 30,000 lira, second 15,000 lira, and third 5,000

lira. Competitors will jump from an aeroplane flying at an altitude of less than 1,000 metres, and the prizes will be given for alighting, without incident, as near as possible to a pre-determined point.



LONDON-PARIS FROM THE AIR, AS SEEN FROM A HANDLEY PAGE MACHINE ;
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THE NAVY AND THE R.A.F.

FOLLOWING the statement of Mr. Amery, Parliamentary Secretary to the Admiralty, on the Navy Estimates, the Navy made its expected claim for a separate Air Service, Rear-Admiral Sir R. Hall moving, on March 16, "That in the opinion of this House, the naval Air Services should be put under the control of the Board of Admiralty for the full development of the efficiency of these services, for their better co-operation with the Navy, and for the most economical administration and expenditure." The gallant Admiral then proceeded to put his case for a separate Air Service. He contended that for some years to come the carriage of trade and troops at sea will be done by surface ships, and that we are faced with the problem of defending or attacking shipping carrying troops, which involves acknowledgment of maritime conditions of transport work. The advent of the air arm necessitates assistance by and defence for aircraft, but this did not mean, the Admiral said, that the air should act separately any more than the introduction of the submarine meant that the submarine should act separately. He thought that if there are two separate services the authorities of each will develop their own theories as to the best employment, and we should have two sets of people studying the problem of invasion in separate watertight compartments. No division is practicable, Sir R. Hall maintained, in the case of the sea and the air, working in combination to maintain control of a given water area for a prolonged period. The Admiral asked whether the Air Service is to decide what allocation of aircraft is to be made, maintaining that it cannot have the knowledge necessary as a basis on which to form its opinions. In minor strategy, the Admiral said, the air arm is part of the naval arm, and must be worked in combination with it. A separate air service necessitates a separate air staff and the development of a strategy of its own. When coming to the question of battle, and the tactical side of air operations, he contended that here also there must be a dissipation of effort by duplication. He admitted that the Air Force is capable of performing many important functions, but in battle it must be for the naval authorities to decide how many of these functions require to be developed. In fact, the Admiral contended that there is no place at sea for a separate air service. By way of showing, by an example, the fallacy of a separate service, the Admiral stated that one of the prime causes of the failure of the German submarine campaign was that in the German navy the submarine was practically an independent service, and its operations were not co-ordinated with those of the High Sea Fleet. By way of strengthening his claim for a naval air service, the Admiral stated that he did not know of any foreign nation which has a separate air force, and he did not know of any Admiral of a foreign nation who recognised a separate air force, nor did he know any distinguished British Admiral holding a high position at sea today who recognises a separate air force.

As regards the questions of economy and personnel, the Admiral called attention to the fact that we have a largely reduced Navy, with large barracks which are half empty, and staff colleges at Greenwich which will bear filling up. If we have our officers in the Navy who specialise in air, the Admiral thought that perhaps when the attractions of flying are not so great, or when old age creeps on them, they can give up active service and return as specialists, become staff officers in air, and eventually Admirals who know something about the air.

Viscount Curzon seconded the motion, and denied that the Admiralty were hostile towards the R.A.F. He referred to the various functions of aircraft as they are used today, but admitted that in the future aircraft would probably become even more important, and said he would not be surprised if, in the future, the Commander-in-Chief himself had to go up in an aeroplane in order to direct his fleet. He said that the Fleet has aircraft carriers, but neither the Admiral in command nor the Admiralty have any control or responsibility for the machines carried or for the personnel. The Air Ministry may withdraw pilots if they want to do so and send them to another quarter of the globe. In conclusion, Viscount Curzon said he would like the Government to consider whether some Committee could not be set up to enquire into the use of aircraft by both Services.

The Air Ministry : Government's Decision

Mr. Chamberlain, in reply to the matters brought up by Rear-Admiral Sir R. Hall and Viscount Curzon, said that if these matters had related solely to the Navy he would not have thought it necessary to intervene. But questions had

been raised which could not be confined to a single Service, but which, in all their implications, affected the three fighting Services and the fighting Ministries. It seemed proper, he said, that the statement of Government policy should be made by a Minister, not the head of one of these various departments, but on behalf of the Government as a whole. Mr. Chamberlain pointed out that he was not laying down a policy for all time, but that in what he was about to state he was declaring the policy of the Government as things stand, and that it was essential that that policy should be known. He thought that the gentlemen who had moved and seconded the amendment had said everything that could be said in support of their amendment from their point of view. This was admittedly and essentially a rather narrow point of view. Mr. Chamberlain made a very excellent point in referring to the statement that it was not fair to take enterprising officers from the Naval Service for the service of the country in another sphere. He would point out that we have a common country, and that all these Services exist, and only exist, for the defence of that common country. We must therefore look at it, he said, from a wider point of view. Mr. Chamberlain then gave a brief, but most excellent review of what has been the history of the Air Service up to the present time. As there is always a danger that the steps which led to the formation of the R.A.F. may be forgotten, we publish this part of Mr. Chamberlain's speech in full as follows:—

"In 1912 a scheme for the creation of a Royal Flying Corps was laid before Parliament. The theory on which that scheme was based was that the needs of the Navy and Army differed, and that each required a technically developed arm respectively to sea and land warfare, but that the foundation of the requirements of each Service was identical—namely, an adequate number of efficient flying men. The aeronautical service therefore was to be regarded as one, and was designated at that time the Royal Flying Corps. It consisted of a naval and military wing, maintained at the expense and administered by the Admiralty and the War Office respectively. There was established, further, a single Royal Aircraft factory, common to both Services, and a central flying school, all graduating at this school to remain to specialise in naval and military flying, and in order to secure co-ordination between the two branches of the Royal Flying Corps an Air Committee was set up as a Sub-Committee of the Committee of Imperial Defence. My right hon. and gallant friend (Maj.-Gen. Seely) was the first Chairman of that Committee. But even from the first there was a tendency for the two Services to drift apart, and in 1914, before the outbreak of the War, the naval wing of the Royal Flying Corps had already changed its title to the Royal Naval Air Service, and with the outbreak of hostilities the separation of the two Services was virtually complete. That is the first stage in the history of this arm. When war broke out the War Office were responsible for the aerial defence of the country, but all the squadrons of the Royal Flying Corps were engaged in France, and at Lord Kitchener's request the Admiralty took responsibility for home defence against aircraft early in September, 1914. Therefore for the first two and a half years of the War expansion of the two branches of the Air Service was developed independently, both as to organisation and supply, by the naval and military authorities. What was the result?

"My hon. and gallant friend proudly boasts that the Navy got all the best machines and all the best officers. How did it get them? Was that distribution dictated by the country's needs at the moment, or by any consideration of the country's need? It was dictated by a fierce inter-departmental competition in the market, the resources of which at that time were wholly insufficient to supply the Services. It was a haphazard and, therefore, a dangerous arrangement. It was an accidental, and, therefore, could not be a considered, arrangement. It resulted in overlapping, waste of effort, one Department bidding against another in the distribution and application of the resources of the country, not according to a considered view of the country's needs, but according to the relative skill and relative quickness of the different Departments in getting hold of what resources were available. Those are the great and glorious days the hon. and gallant gentleman holds up to us as providing that which his Amendment would provide, and which the present system does not.

"Towards the end of 1915 so patent were the facts that there arose a strong movement for co-ordination, though

it was not at the time proposed to combine the two Services, because it was clear that for a considerable time to come the great bulk of the work in the air would be of a definitely naval or military character. There was already a strong body of opinion in favour of an Air Minister who should have entire control of the Services, and a status equal to that of the First Lord of the Admiralty or the Secretary of State for War.

"The next step in co-ordination was that in February, 1916, a Joint War Air Committee was appointed to collaborate in and co-ordinate questions of supply and design of material for the Naval and Military Air Services. That was not without some relation to the state of things on which my hon. and gallant friend (Sir R. Hall) so lovingly dwelt. The Committee failed to present an agreed Report, and it was brought to an abrupt end by the resignation of its chairman (Lord Derby). That committee was succeeded by an Air Board, constituted on May 11, 1916, under the Presidency of Lord Curzon. This Board was free to discuss matters of general policy in relation to the air, including combined operations of the Naval and Military Air Services, and to make recommendations to the Admiralty and the War Office thereon, as well as to discuss and make recommendations on the types of machine required for the two Air Services. If either Department declined to act upon its recommendations, the President had the right of reference to the War Committee. The Board was also charged with the task of organising and co-ordinating—observe how often the word co-ordinating comes in; I emphasise it because it means that the system was not working smoothly, that there was not one but two policies often clashing and constantly overlapping—the supply of material and to prevent competition between the two Departments. Finally, it was responsible for the co-ordination of research in aerial matters between all the bodies concerned.

"After further experience, in November of that year, 1916, the Government, after prolonged enquiry, decided on further developments, providing for the Admiralty and War Office to concert their respective aerial policies in consultation with the Air Board and submit their programmes of aerial production to the Air Board, which was to decide as to the extent to which the Departmental programmes were to be approved, having regard to the rate of production, the needs of other Departments and the respective urgency of the demands. Every one of these steps was necessary because the profound lack of co-ordination and of a central control had landed the country in difficulties and had failed to provide us with a satisfactory defence. A change of Government took place in December of that year, but the new Government confirmed the decision of its predecessor, and the new Air Board was actually constituted on February 6, 1917. Up to the middle of 1917 all the aerial output was absorbed by the older Services. The supply could not overtake the demand. The constantly growing series of activities to which aircraft was successfully applied outstripped the progress of manufacture, and forced us to apply all the machinery available for a purely naval or purely military purpose, and the building up of a reserve for an independent aerial campaign against Germany was impossible. By July, 1917, however, the Ministry of Munitions had the supply position well in hand. A deadlock appeared to have been reached both in the naval and military theatres, and it seemed conceivable that a sustained air offensive might contribute more powerfully than any other factor towards undermining the moral of the enemy and disposing him towards a reasonable peace.

"It was perfectly clear, however, that unless there was a properly constituted Air General Staff under an Air Board or under an Air Ministry, aviation output, however large, would continue to be absorbed by the two Services already existing. Accordingly, in August, 1917, the Government decided in favour of the principle of uniting the Air Services and of providing a special branch for the systematic raiding of German munition centres, and an Air Organisation Committee was appointed, under the Chairmanship of Gen. Smuts, to work out the details for an Air Ministry, an Air Council and a combined Air Force. The Air Council was set up by Order in Council on December 21, 1917. The independent Air Force was constituted on June 8, 1918, under the then General, now Air-Marshal, Sir Hugh Trenchard, who was placed directly under the Air Ministry, although for purely operation purposes Gen. Trenchard was under the supreme command of Marshal Foch. It was during this latter period, subsequent to the formation of the Air Ministry, that our Air Services achieved their maximum successes in the War. Although in 1918 a serious shortage in the supply of high-powered engines curtailed that programme, the limited

amount of raiding which took place had a considerable effect on the enemy. It is well known that if the War had lasted a little longer the range of our bombing squadrons would have greatly increased and would probably have included Berlin. From that time to this the Air Force has remained a separate force under the Air Ministry.

"I hope the House does not think that I have taken too long with the summary, which I could not well have made shorter if I were to give the House all the events that led up to the formation of the Air Ministry and of a separate Air Board by an Act of Parliament on the decision of this House. It will be seen that it was war experience which led to the creation of the Air Ministry, and to the constitution of a separate homogeneous Air Force. It was not theory derived from speculation in the past, but it was practical experience after trying a great many other experiments, and the deficiencies which they left, which proved to the Government in the pressure of the War, and for the successful conduct of the War, the necessity of creating the system now in force."

Viscount Curzon: "After the Air Ministry was constituted did the Services retain control of the aeroplanes working with them, or were they controlled by the Air Ministry?"

Mr. Chamberlain: "The independent force was directly under the Air Ministry, subject to the supreme control of Marshal Foch. Air squadrons working with the Army were under the Army Command, and air squadrons working with the Navy were under the Naval Command. Now I return to the lessons which we derived and the inferences which we formed from this war experience. However elaborate the machinery for co-ordination, whatever the goodwill and the desire to co-operate between the different Departments, it was found during the War supremely difficult to achieve full efficiency in the Air Services so long as those Services remained divided, part under the War Office and part under the Admiralty. So long as the supply of machines and engines remained under the two Departments there resulted only a disastrous and wasteful competition. We were driven step by step to a greater concentration of responsibility for the Air, until by Statute the Air Ministry and the Air Board were constituted as they exist today. It was only after the Air Ministry was constituted, with its air staff, that the aeronautical aspects of the War were considered from a distinctly Air point of view and by aerial officers. Until that time the Air was under purely naval or military command, and was only thought of in terms of naval or military warfare.

"I do not want it to be thought that the Government are blind to the real difficulties which arise out of the present system. I do not pretend for one moment that it works with perfect harmony or smoothness or gives satisfaction to everybody, but our view is that the objections to the re-absorption of the Air Forces by the Army and Navy are far greater than any objections under the present circumstances and for the time to which we can look forward—as I have said before, I am not pretending to lay down a policy for all time—which can be raised against the existence of a separate Air Ministry and Staff. If the Air Services were required only as an adjunct to the naval and military Services there would be much to be said for their re-absorption, though I do not think that even then the case would be conclusive, for there would remain the necessity for preventing the kind of competition which took place with such unhappy results during the War.

"It is imperative that there should be the closest co-operation and the closest communication and understanding between the heads of the different Services of the needs, requirements and capabilities not only of their own Service, but of the other Services with which they have to act in common. These are points for which we must provide, but we have in addition to consider the development of the aerial forces in their own elements and use those forces for operations independent of both the Navy and the Army. Already great progress has been made in that direction. My right hon. friend, the Secretary of State for the Colonies, recently gave the House some very interesting information as to the success of the Air Force in carrying out independent action, and as to the use which we are making of it in Mesopotamia at the present time, and also in Somaliland, but not wholly independent there. The Government believe, then, that if the Air Service were reabsorbed by the Navy and the Army, this aspect of the service to be rendered by the Air Force would inevitably be relegated to the background. Sailors and soldiers would continue to think of the force in terms of their own Service, and would not pursue, and could not be expected to pursue, its development as an independent force outside the purpose with which it was associated, and for which they desired that it should be employed. Believing, however, as we do that the Air Forces have immense poten-

tialities of their own, and in their own element, distinctive from their other and vitally important duties in connection with the naval and military services, the great importance of which is not in the least underrated, and convinced as we are in the future that the greatest danger to this country may well be from the action of air forces, rather than of naval or military forces, we consider that it would be a retrograde step at this time to abolish the Air Ministry and to reabsorb the Air Service into the Admiralty and the War Office.

"It is true that no other nation as yet has followed our example in this matter, but I think that I am correct in saying that some high authorities in other countries think that the course which we have taken is the right course, and are contemplating or discussing the advisability of following it in their own case. It is notorious that more than one great Power is most anxiously canvassing the whole situation, and I think it not unlikely, to put it no higher, that we shall find our example followed if we do not ourselves abandon it. The House will be anxious to know in these circumstances how we propose to secure the proper co-operation and co-ordination of the Services, and what rules we shall lay down to secure that the Army shall have the aid from the air which is required, and that the Navy shall have the aid from the air which it requires. This is a subject which has for a long time, and very carefully, been considered by a Standing Committee of the Committee of Imperial Defence, under the chairmanship of my right hon. friend the Lord President of the Council. As the result of that enquiry we have come to certain decisions, which I hope I may be permitted to give in their entirety, though they are not confined to co-operation between the Air Force and the Navy, because, as I have said at the beginning of my speech, it is impossible for the Government to treat this matter as the hon. and gallant Member for the West Derby Division of Liverpool (Sir R. Hall) very easily and fairly put it in moving his Amendment, as one to be decided in the light of naval considerations alone. We can only come to, and defend, our decision by a survey of the whole position. These are the conclusions at which we have arrived:—

"In the first place, that the Air Force must be autonomous in matters of administration and education.

"Second, that in the case of defence against air raids the Army and Navy must play a secondary rôle.

"Third, that in the case of military operations by land or naval operations by sea, the Air Force must be in strict subordination to the general or admiral in supreme command.

"Fourth, that in other cases, such as the protection of commerce and attacks on enemy harbours and inland towns,

the relations between the Air Force and the other Services shall be regarded rather as a matter of co-operation than of the strict subordination which is necessary when aeroplanes are acting merely as auxiliaries to other arms.

"Lastly, the Government have decided to appoint a Committee which will, I say without hesitation, consist either of the Standing Committee or the Sub-Committee of the Committee of Imperial Defence, to examine carefully into the system of naval and air co-operation, and to advise us how we can best secure that the Air Force should be enabled to render to the Navy, and in connection with the Navy other services, the aid that they may require."

Finally Mr. Chamberlain said: "To sum up what I have said, the Government believe that to abolish the Air Ministry, to reabsorb the Air Service into the services of the Army and the Navy, would be a fatally retrograde step. Even if it removed a little friction and improved and facilitated the co-operation between the Air Services and purely naval and military operations, which is very doubtful, it would unquestionably retard the development of the Air Services in their own element, in which it may be that the future of national defence lies. To take this step would be to bring back also all the evils of divided control which existed in this matter in the early part of the War. The decision of the Government to establish a separate Air Ministry was based, as I have said, on war experience. What is now required in order to ensure the success of the present scheme is close and intimate co-operation, and that the three Services should regard themselves as the common servants of the nation in endeavouring to attain a single object. This cannot be achieved so long as the existence of the Air Ministry and the Air Force remains in doubt, and the Government thought it right and fair to that service and to the distinguished officers who are at its head, and no less fair to the other two great Services, that they should define their attitude in this matter so that all may know what is expected of them and what system they would have to follow."

Maj.-Gen. Seely expressed satisfaction with the definite and final decision of the Government to maintain a separate Air Force and Air Ministry.

Rear-Admiral Sueter also expressed satisfaction with the very clear statement of Government policy, but regretted that the Government could not set up a Ministry of Defence.

Mr. Chamberlain then suggested that the amendment should be withdrawn.

Sir R. Hall: "I fear it will be a great disappointment to many Members who came to the House primed with speeches, but after the statement made by the Leader of the House I beg to ask leave to withdraw my Amendment."

THE AIR ESTIMATES

AIR estimates for 1922-23, issued on March 17, show a net reduction on those for the current financial year of £7,516,477. The estimated gross expenditure is £15,666,500, but appropriations-in-aid are expected to realise £4,771,500, leaving a net total of £10,895,000. This sum includes war liabilities amounting to £959,500.

It is proposed to reduce the force by the equivalent of two squadrons, the decrease in officers and men provided for being 9,704. The totals for the two years compare as follows:—

Net estimates, 1922-23	£10,895,000
Revised estimates, 1921-22	18,411,477

Net reduction	£7,516,477
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Numbers, all ranks, 1922-23	31,176
Numbers, all ranks, 1921-22	40,880

Decrease	9,704
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The general abstract of the estimates gives the following net figures under the various heads of expenditure:—

Pay, etc., of the Air Force	£3,781,000
Quartering, stores (except technical), supplies, and transport	1,530,000
Technical and warlike stores	1,295,000
Works, buildings, and land	1,826,000
Air Ministry	680,000
Miscellaneous effective services	85,000
Civil aviation	364,000
Experimental and research services	1,177,000
Half-pay, pensions, and other non-effective services	157,000

Total	£10,895,000
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As regards establishment, the numbers on the strength of the active force, exclusive of officers and men serving in India, are as set out below:—

Air officers	20	Airmen	22,195
Comm'd officers	2,909	Boys	1,700
Cadets	100		
Warrant officers	300	Total	31,024
N.C.Os.	3,800		

The remainder consists of 11 air officers, 122 commissioned officers, and 5 other ranks attached to the Air Ministry, and 14 commissioned officers engaged in experimental and research services.

War Liabilities

In expenditure the principal reductions are in pay (£1,023,010), quartering, supplies and transport (£1,575,000), technical and warlike stores (£2,463,000), works and buildings (£1,192,000), civil aviation (£516,000), and research services (£529,000). In the case of technical and warlike stores the principal heads compare as under:—

	1922-23.	1921-22.
	£	£
Aeroplanes, seaplanes, and engines	786,000	1,837,000
Airships and airship engines	100	16,800
Aircraft technical and warlike stores	22,500	49,000
Armament and ammunition	139,500	249,500
Electrical stores	79,500	99,000
Miscellaneous engineering stores	22,500	31,000
Miscellaneous materials	66,500	116,000
Hangars	2,000	46,250
Mechanical and other transport	214,300	659,000
Petrol and oil	360,000	471,000

In the case of civil aviation the chief items of expenditure are: Civil aviation subsidies, £207,000; aerodromes, £38,000;

works and buildings, £61,000; meteorological services, £79,000; aerial routes (surveys, etc.), £15,000.

Appended are details of the war charges included in the estimates:—

Rewards to inventors and miscellaneous claims	£500,000
Liquidation of war contracts, reinstatement of public roads, and completion of necessary war services..	133,000
Compensation in respect of the occupation of land..	155,000
Reinstatement of lands and buildings on relinquishment, etc.	131,500
Liquidation of war contracts for experimental aircraft, etc.	40,000
Total war liabilities	£959,500

In an explanatory memorandum accompanying the Estimates Capt. Guest outlines the steps taken to give effect, where possible, to the Geddes Committee's recommendations, and the reasons which have prevented the adoption of certain of that body's proposals. He states:—

The net total of the estimates now presented is £9,935,500 for normal services and £959,500 for war liabilities, making £10,895,000 in all. The comparable figures for 1921-22 (original estimates) were £15,809,000 for normal services and £1,471,000 for war liabilities, making £17,280,000 in all. There is thus a reduction of about £6,400,000, or 37 per cent. A reduction of some 20 per cent. was, in compliance with the directions given by the Government to all departments, effected in the sketch estimates prepared in July, 1921, and laid before the Geddes Committee; the remaining savings have been effected subsequently on lines partly suggested by the Committee and partly arrived at independently. The process has been continuous, and some further reduction has even been made on the figure provisionally approved by the Government and embodied in the forecast of expenditure recently submitted to the House of Commons by the Chancellor of the Exchequer.

The estimates provide for an appropriation-in-aid amounting to £3,733,000 in respect of Middle East services. This sum is voted under Class V, 3, of the Civil Service Estimates, and is repaid by the Colonial Office to the Air Ministry. The figure includes provision for works and other ancillary services, and increased provision for armoured cars, the cost of which has hitherto fallen on Army Votes, the transfer of responsibility for these services being made in consequence of the recently approved schemes of Air Force control in Iraq and Palestine. Omitting these transferred services, the comparable figures for air units in the Middle East are £1,571,000 for 1921-22 and £1,750,000 for 1922-23, the latter being approximately the same as that laid before the Geddes Committee in the sketch estimates. The increase of the provision under certain subheads of the Votes for 1922-23 over that under the same subheads for 1921-22 is due to expenditure on the transferred services in the Middle East. These subheads are gross figures, the appropriations-in-aid, which include repayment for such expenditure, being shown in the final subhead of each Vote. The net figures for complete Votes are consequently a better basis for comparison between the two years.

The active strength of the Air Force will be reduced by the equivalent of two squadrons. The Geddes Committee contemplated that, failing some equal or greater reduction in the Navy or Army, a reduction of $8\frac{1}{2}$ squadrons could be made. The Government have not felt able to accept this recommendation, but they have fallen in with the views of the Committee to the extent of directing that over and above the actual reduction of two squadrons the equivalent of three

more squadrons should be withdrawn from Navy and Army co-operation and allocated primarily to Home Defence. These squadrons will still be available for co-operation work on special occasions when required. They will also be used for training purposes, thus enabling economies to be made in the training establishments.

The reduction of £5,500,000 on the sketch Air Estimates which the Geddes Committee believed to be possible (but which the Air Council were unable in large part to verify upon analysis) compares with a reduction of over £2,500,000 embodied in these estimates, a figure which would have been still higher had it not been for variations in appropriations-in-aid since the sketch estimates were framed. A considerable portion of this difference is attributable to the fact that, as explained above, in order not to denude the Navy and Army of Air co-operation, and in order to enable the nucleus of a force for Home Defence to be set up, all but two squadrons are to be retained.

The remaining recommendations of the Committee have received the most careful consideration, and effect is being given to them to a very large extent. To take the most important items of reducible expenditure, works services have been cut to bare minimum, and stocks of machines, engines, and spares will be drawn on without replacement wherever possible. Here, however, a word of caution is necessary. The "reconditioning" of machines is not a process of improvement and embellishment, but one of making machines safe to fly. Economies in this direction must be governed by a sense of the most serious responsibility. Apart from this it should be realised that the patching up of temporary buildings and living on stocks is essentially a process of deferment of expenditure which must tend to force Air Votes up again in future years, and is justified only by extreme financial pressure.

The general principles on which the training of the technical personnel of the Air Force is founded will be maintained, but in order to reduce the cost the existing scheme will be modified by lengthening the term of service of boy mechanics on completion of their training. A token sum of £20,000 has been included to provide for the inception of the scheme of an Auxiliary Air Force on a territorial basis. The same provision was made in the current year, but the Air Council have felt compelled, with much regret, to defer this expenditure for another twelve months. A severe scrutiny has been applied to the staff of the Air Ministry, and the expenditure forecasted last July has been reduced by nearly £150,000. The total reduction on the sum provided for the current year is £235,000.

The recommendations of the Geddes Committee in regard to civil aviation have been accepted in principle, but existing commitments have made it necessary to provide some £50,000 more than the committee believed would be required on that basis. The approved scheme for subsidies for cross-Channel flights, as published, which comes into full operation on April 1, remains unaffected.

A reduction of some £320,000 has been made on the sum provided in the sketch estimate for experiment and research. This falls appreciably short of the committee's recommendations, but it was found that existing objections and commitments would have accounted for the whole of the reduced figure which they suggested, and would have left nothing over for the development of new ideas during the coming year. This was a position which, in the case of a new science like aeronautics, it was hardly possible to accept, and provision has therefore been made, though on a very restricted scale, for some experimental orders to be placed in 1922-23.

Our Prince's Departure from India

"THE Air Force provided the last guard of honour at Kiamari," is the note made by *The Times* special correspondent, cabling from Karachi on March 17 an account of the departure from India of the Prince of Wales after his wonderful tour.

The Marseilles-Monaco Seaplane Contest

LAST week we published a list of the entrants for the seaplane contest at Marseilles, a *Croisière* from Marseilles to Monaco. The following official entries by the Navy (competing *hors de concours*) are now to hand: Capt. Henri Lefranc (Hanriot, 130 Clerget); Second Mate Yves le Roux (G.L., 300 Renault); Lieut. Maurice-Réné Mas de Saint (G.L., 300 Renault); Second Mate Jean Riou (G.L., 300 Renault); Master-Pilot Alfred Fourchon (Hanriot, 130 Clerget); Second Mate Yves Lantz (F.B.A., 130 Clerget); First Mate Mathurin Le Hyaric (Hanriot, 130 Clerget); Mate

Desire Pierre (Hanriot, 130 Clerget); Second Mate, Pilot Henri Priol (F.B.A., 130 Clerget); Ensign Raymond Protoche (F.B.A., 200 Hispano); Lieut. Jean Raffin (F.B.A., 200 Hispano); Second Mate Rousselet Gerasi (F.B.A., 200 Hispano).

Rotterdam-London Air Service

THE Koninklijke Luchtvaart Maatschappij voor Nederland en Koloniën of Amsterdam inform us that they intend reopening the line Amsterdam-Rotterdam-London on April 18 with one daily service in both directions for the present. Later this service will be twice daily. The time table (summer time) of the one daily service will be as follows:—

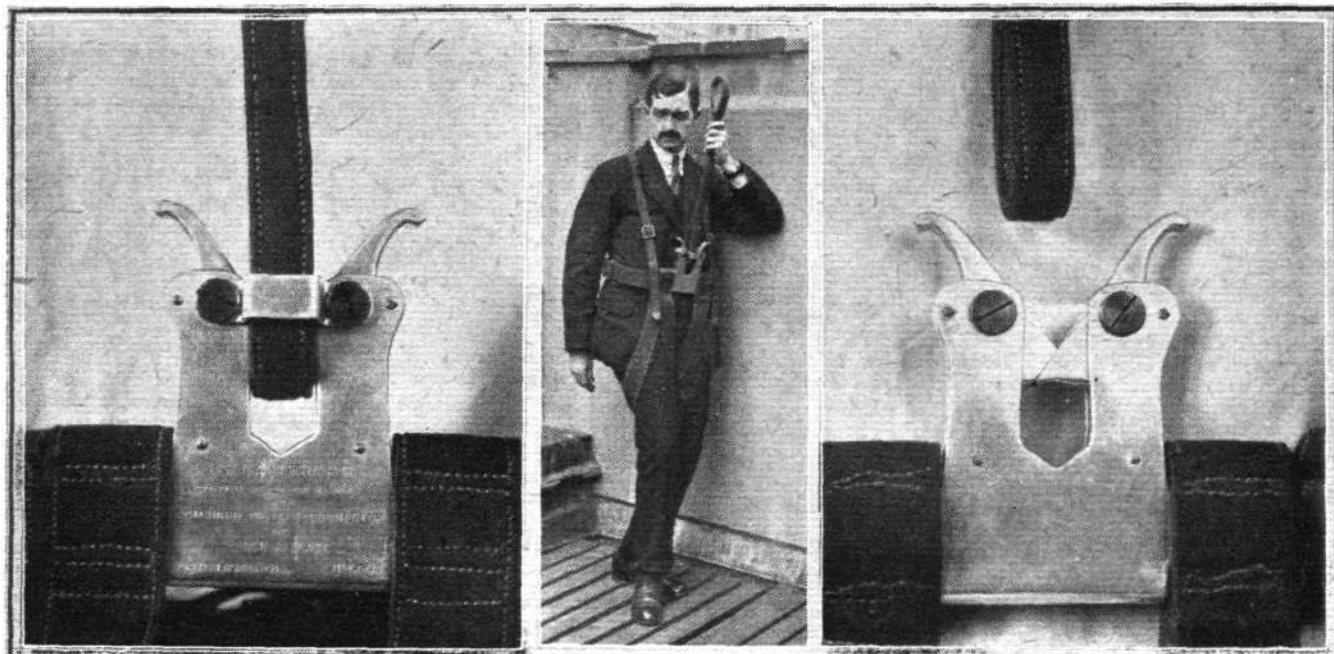
Departure, London, 10 a.m.; arrival, Rotterdam, 1.30 p.m.; departure, Rotterdam, 1.45; arrival, Amsterdam, 2.15.

Departure, Amsterdam, 2.0 p.m.; arrival, Rotterdam, 2.30; departure, Rotterdam, 2.45; arrival, London, 5.30 p.m.

THE CALTHROP "H" TYPE PARACHUTE AND FRONTAL SUSPENSION HARNESS

In the latest model "Guardian Angel" Parachute manufactured by E. R. Calthrop's Aerial Patents, Ltd., of 423A, Edgware Road, several very important improvements on the earlier types are to be found. The remarkably quick and reliable positive opening still forms the principle characteristic of this "H" type parachute, but its method of functioning has been very much simplified. As no doubt many of our readers are aware, in the original "Guardian Angel" parachute the silk body is folded between two aluminium discs, contained within a case in such a way that, as the parachute is withdrawn—by the fall of the load—it unfolds progressively from periphery to centre over the lower, or launching, disc, which serves to keep the walls of the parachute apart, and allows a column of air to become imprisoned within from the moment the periphery of the parachute emerges from the case. The parachute rigging, or tapes, it should be mentioned, are also folded in separate units below the launching disc, and similarly unfold by the pull of the falling load—the parachute body emerging, of course, as soon as the rigging is fully extended.

In connection with this parachute, mention must be made of the new harness and combined instant-connector and quick-release. The question of attachment (of aviator) to the parachute is a very important one, and considerable thought and experiment has been given to this matter by Mr. Calthrop. There are some aviators who object to carrying the weight of a parachute—about 20 lbs. is the lightest that can be used with safety—on the body during normal conditions, whilst the restriction to freedom of movement, especially in the case where the aviator is connected by the life-line to the parachute (mounted on some part of the machine) all the time the machine is in flight, is a decided drawback. It would, therefore, be of great advantage if the aviator were free of any connection, and could, in the event of a catastrophe, instantly attach himself securely to his parachute, in order that he may make his jump without loss of time. Again, it has been found from past experience with parachutes, that when the parachutist reaches the ground, there is a period of from 5 to 7 secs. when the parachute, in passing from its vertical position to an angle of about



THE CALTHROP "H" TYPE PARACHUTE : The Frontal Suspension Harness, and the combined instant connector and quick-release, used in connection with this parachute.

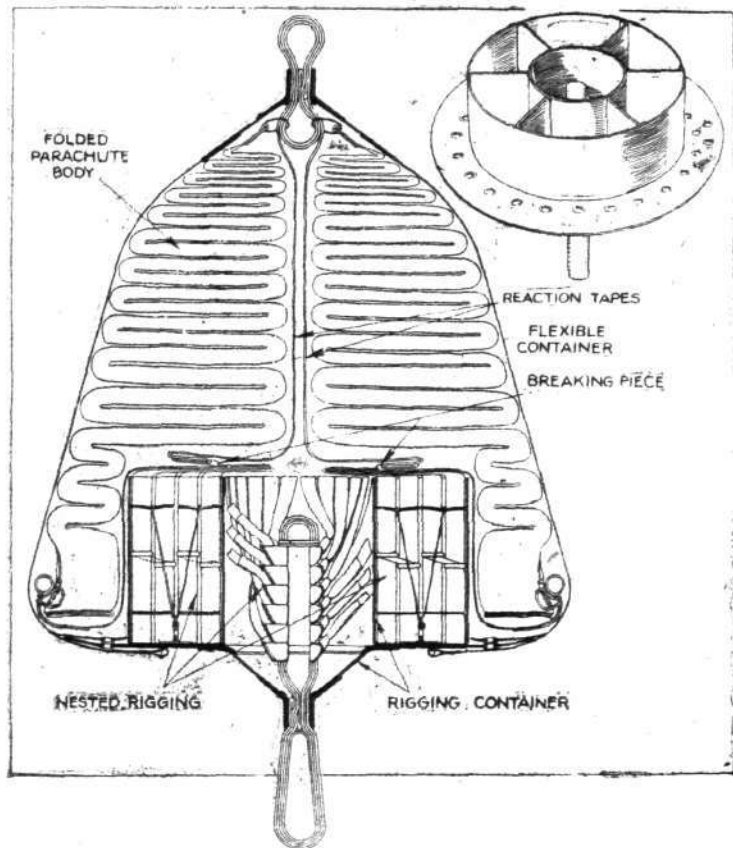
In the "H" type, these aluminium discs are dispensed with, and the parachute body is folded in a series of vertical pleats and progressive horizontal folds within a flexible container, which is slung from the aircraft. The periphery is pleated edgewise at the base of the container, where, in the centre, is another container housing the rigging, which is folded in isolated units as before. Attached to the rigging container is the connecting loop to the life-line from the harness.

The action of the parachute is as follows. The weight of the falling load first pulls away the rigging container, the parachute body remaining in the main container on account of its centrifugal springing outwards. As the rigging container falls, the nested tapes unfold until momentarily checked by the reaction tapes, which extend from the top of the container and are attached by breaking cords to the rigging tapes. On these breaking pieces snapping the pull of the load comes synchronously upon the whole periphery of the parachute, which then issues instantly from the container. The periphery, having been held in a true circle pressing outwards inside the container, expands instantly to a circle of about 24 ins., thus providing a large opening by which the uprising air can enter the body—the principal characteristic of the "Guardian Angel" parachutes. The ventilator ring in the top of the parachute is held in the top of the container by breaking-pieces which snap when the body is fully extended.

45°, exerts no pull upon the parachutist, even in a high wind. Afterwards the pull is again exerted, sometimes with considerable force and not without some danger to the parachutist. In fact, cases have been known, during the war, in which observers, having descended in safety from a burning kite-balloon, have been dragged by their parachutes through barbed-wire entanglements and terribly mutilated or killed. It is essential, therefore, that a parachutist should be able to release himself during the period of "slack" previously referred to. On the other hand provisions should be made whereby it is impossible for the parachutist to become disconnected, accidentally, from his parachute until the right moment.

All these points have been kept in view in designing the extremely ingenious instant-connector and quick-release employed on the "H" type "Guardian Angel." This device is exceptionally simple in construction and operation, and is absolutely fool-proof. It consists of only two moving parts (exclusive of springs) and can be operated by one hand. Briefly, it comprises two detents, or jaws, carried in a substantial aluminium frame-plate, which is secured in the waistbelt of the harness. These detents interlock through the action of springs mounted in the frame, and so form a bridge across a gap in the centre of the frame-plate. When the connecting loop from the parachute is pressed down on to the detents, they open and allow the loop to pass between them into the space below them. They then spring back

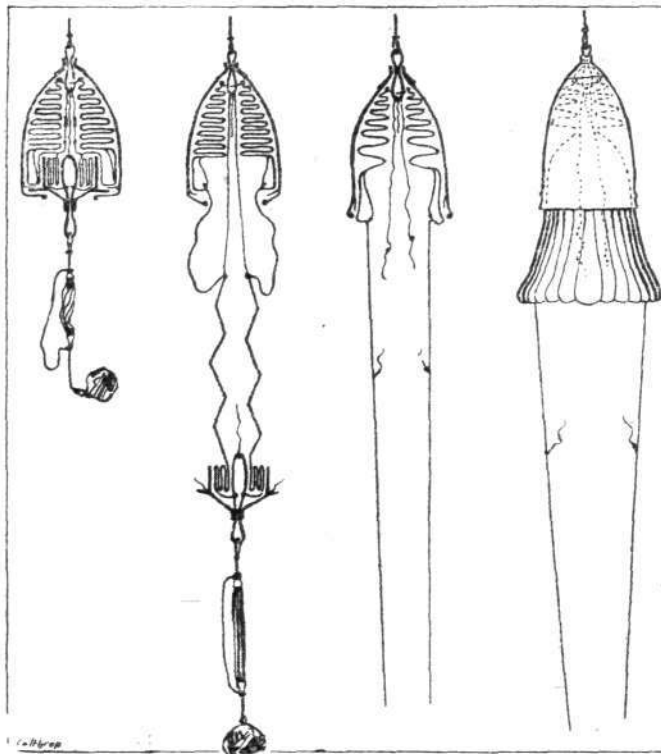
into their original position, and the weight of the parachutist, the frictional resistance of the detent points in the lifting of the load through about $\frac{1}{4}$ in., together with the shortness of the operating levers, render it absolutely impossible for the detents accidentally to draw apart and release the connecting loop—so long as there is a load on the latter.



THE CALTHROP "H" TYPE PARACHUTE : Sectional drawing showing, more or less diagrammatically, the body folded in the flexible container. In the right-hand top corner is a detail view of the rigging container.

for the greatest possible comfort combined with safety, and that the connector-release is very securely built into the belt—it is not dependent on bolts or rivets—at the exact point where the stresses are concentrated upon the harness. A rigid and strengthened sector, with elastic connections at the ends, prevent undue compression on the aviator's ribs.

The weight of the complete harness, with shoulder straps, is 4 lbs. 11 oz., the weight of the connector-release being 1 lb. The weight of the "H" type parachute, in its container,



THE CALTHROP "H" TYPE PARACHUTE : Diagrams showing four progressive stages in the operation of the parachute.

Neither detent can be operated when the load is on them, and both have to be operated to effect the connection on release. As soon as the pull on the loop ceases it is an easy matter to press the operating levers together and so unlock the detents, releasing the loop. Thus instant connection to the parachute and instant release on landing are obtained.

As regards the harness, little need be said further than that its design, the result of considerable experience, makes

is about 20½ lbs., and it is worthy of note that not only is this parachute extremely compact when packed—measuring about 18 ins. by 26 ins.—but it is so non-rigid and flexible in its container that it can be distorted without the least effect upon its speed and reliability of action. A modified device is now being worked out by Mr. Calthrop to enable a passenger to make a free jump in the air without the container being attached to the aeroplane.

THE ROYAL AERO CLUB OF THE U.K.

OFFICIAL NOTICES TO MEMBERS

ANNUAL GENERAL MEETING

The Annual General Meeting will be held at the Club premises, 3, Clifford Street, London, W. 1, on Wednesday, March 29, 1922, at 6 o'clock.

Agenda

1. Chairman's Report.
2. To announce result of Ballot for Committee.
3. To elect President, Vice-President and Council for the ensuing year.

Committee

The following Members have been nominated for election to the Committee:—

Group-Capt. F. W. Bowhill, C.M.G., D.S.O., R.A.F.
Maj.-Genl. Sir W. S. Brancker, K.C.B., A.F.C.
Ernest C. Bucknall.
G. B. Cockburn.
Flight-Lieut. L. H. Cockey, R.A.F.
Col. F. Lindsay Lloyd, C.M.G., C.B.E.
Lieut.-Col. J. T. C. Moore-Brabazon, M.C., M.P.
Lieut.-Col. Mervyn O'Gorman, C.B.
Air-Commodore C. R. Samson, C.M.G., D.S.O., A.F.C., R.A.F.
Sir A. Mortimer Singer, K.B.E.
Ballot papers have been posted to all Members, and should be returned not later than 12 noon on Tuesday, March 28, 1922.

COMMITTEE MEETING

A meeting of the Committee was held on Wednesday, March 15, 1922, when there were present: Brig.-Genl. Sir

Capel Holden, K.C.B., F.R.S., in the Chair; Mr. Ernest C. Bucknall, Lieut.-Col. J. T. C. Moore-Brabazon, M.C., M.P., Lieut.-Col. Alec Ogilvie, Lieut.-Col. M. O'Gorman, C.B., and H. E. Perrin, Secretary.

Election of Members

The following new members were elected:—

Flight-Lieut. C. H. Hayward.
Arthur Ernest Johnson.

Committee Election

The nominations for election to the Committee were reported.

Entrance Fee

It was decided to suspend the Entrance Fee of £5 5s. for new members up to 100 elected during the next six months. New members elected during this period will pay an annual subscription of £7 7s. only.

Gordon Bennett Balloon Race

It was reported that the Club had made entries for three balloons to compete in the Gordon Bennett Balloon Race to be held at Geneva on August 6 next.

Racing Committee

The report of the Racing Committee was received and adopted.

Offices: THE ROYAL AERO CLUB,
3, CLIFFORD STREET, LONDON, W. 1.

H. E. PERRIN, Secretary.

LONDON TERMINAL AERODROME

Monday Evening, March 20.

DETAILS of the new services and time-tables are now becoming available. The Messageries Aériennes have arranged an extensive programme for the coming summer, which includes a new weekly service between London and Marseilles. This service, which is to be operated with "Goliaths," will leave London at 8 a.m. and arrive at Marseilles at 4.45 p.m. Two halts will be made *en route*—one for an hour at Paris, and the other, a short stop of 15 minutes at Lyons. The return machine will leave Marseilles at 7 a.m. and arrive at Croydon at 3.45 p.m., although passengers may break their journey at Paris and come on to London by a later plane.

The Messageries Paris service is to be increased next month to two machines a day in each direction, and in June an additional machine will be put on, leaving the terminals at 5 a.m. This machine is intended for the carriage of newspapers and mail, although, should passengers be forthcoming at this early hour, arrangements would no doubt be made to accommodate them.

The through air-fare to Marseilles is to be £17 17s., and to Lyons £12 12s. Goods will be carried at from 5s. to 3s. 9d. a pound (according to weight) to Marseilles, and from 3s. 9d. to 1s. 4d. to Lyons.

The Messageries will, in addition, run their service between Paris and Havre in connection with the arrival of liners from America.

This Company have also opened London offices in the Haymarket, and have obtained the agency for the French companies running air services from Paris through central Europe, and also for the Toulouse-Casablanca line.

The New Air Offices on the 'Drome.

THERE is still intense activity in the erection of offices. The roof of the one for "Daimler Airways" is now being fixed, and the Marconi Company are erecting an office alongside it.

Handley Page Transport have managed to rent a brick building alongside the tarmac in front of the Customs' House—a position which is undoubtedly the best on the aerodrome—and are busy turning it into offices.

Lloyd's have taken an office on the aerodrome, and their representative is now installed. This is very cheering to civil aviation enthusiasts, who see in the fact that this office is in actual being a definite triumph for air transport.

The K.L.M. have again changed their minds as to their Amsterdam service. They now intend to commence on April 18 with a single service in the morning, which is to be increased on May 15 by the addition of an afternoon service. They do not intend to run their service between Amsterdam and Hamburg this year; but the Danish Company are in

negotiation with the Danish Government for a subsidy to run an air-mail service from Copenhagen to Amsterdam to connect with the night boats to and from England. This service will probably be run with D.H.9's.

The French Air Minister, M. Eynac, came over by "Goliath" during the week to attend the quarterly Anglo-Franco-Belgian Air Conference. He was met on the aerodrome by Gen. Sykes, who also accompanied him on Friday morning when he arrived at the 'drome to return to Paris by air at 9.30 a.m. Unfortunately the weather at that time was unfit, and M. Eynac with his staff returned to London to catch the 11 o'clock boat-train. It seemed as though they had little faith in the weather office, which told them the weather would clear later. This in fact it did, several machines flying between London and Paris during the day, and actually beating the boat-train by hours.

Trial of a New Aero-Engine Silencer

INVENTED by Maj. Grant, of the Disposal Company, a new aero-engine silencer was tested during the week on a D.H.9 flown by Mr. Larry Carter.

The silencer appeared to be quite effective, and, as it is both light and fairly cheap, some of the regular air expresses may be fitted with it shortly.

After much hard labour, workmen managed to dig an enormous hole into the solid chalk to accommodate the new 7,000 gallons' petrol tank; but apparently they dug it in the wrong position. At any rate, it has been carefully filled up, and a new hole is being excavated some ten yards nearer the new hangars.

Capt. Muir of the Surrey Flying Services had one of that company's joy-ride Avros out during the week-end, and business was quite brisk. There should be quite a lot of joy-riding this summer, now that the aerodrome is more attractive; and especially if the crowds which are expected to visit the air-races begin to realise what is going on daily at the station.

The swinging illuminated landing-sign, which has been built by the Gas Accumulator Company, has now been erected at the aerodrome, away in the south-east corner. It is shaped like a huge wind-vane, with side arms, so that from the air it appears like a landing "T." The central light, which shines through lenses along each of the three arms of the "T," sends out a beam of 27,000 candle-power. The "T" can be seen 12 miles away, while the wind-direction will be distinguishable from a distance of from two to three miles. If the sign is found satisfactory, it is intended to erect two or three on pieces of ground which would be suitable for emergency landing. As the light is automatic in action, no attendant would be needed.

IN PARLIAMENT

R.A.F. in Mesopotamia

MR. MALONE asked the Secretary of State for Air whether the flights from Egypt to Mesopotamia are the only routine flights carrying mails, etc., undertaken by the Air Ministry; whether this work was organised by the department of the Chief of the Air Staff or of the Controller-General of Civil Aviation; and which Department now controls this service, and why?

Capt. Guest: The answer to the first part of the question is in the affirmative; as regards the rest of the question, the carrying of mails is, at present, incidental to flights by service machines undertaken for training or for passing machines to Iraq by air in preference to the more expensive sea route. The responsibility accordingly rests with the service branch of the Air Ministry. I look forward to the future organisation of regular air mail services on this route by commercial air enterprise.

Helicopters

MR. L'ESTRANGE MALONE asked whether it is intended to hold a State competition for helicopters; what prizes are offered; what are the conditions; and when will the competition take place?

Capt. Guest: The Air Ministry have decided to offer a prize of £50,000. The conditions under which entries will be received will be announced as soon as possible.

Mr. Malone asked whether the Air Ministry have been following the experiments made by helicopters in various countries; what conclusions have been arrived at by his experts as to the practicability of helicopters for war or civil purposes; and whether he intends to make any practical experiments with helicopters in his Department?

Capt. Guest: The answer to the first question is in the affirmative; to the second, that the advantages of a practicable helicopter for both military and civil purposes are considered sufficiently important to warrant investigation and experiment; to the third, that such experiments are already in progress.

British Airships

SIR H. BRITAIN, on March 14, asked the Secretary of State for Air whether any foreign group has entered into negotiations for the purchase of the British airships; and, if so, from what country?

Captain Guest: The answer to the first question is in the negative; the second does not, therefore, arise.

R.A.F. Reserve

SIR H. BRITAIN, on March 15, asked the Secretary of State for Air whether he is aware of the methods now being adopted by France for the creation of a reserve of officers for her air force; whether anything of a similar nature is being carried out in this country; and what is our total number of reserve officers in this arm of defence?

Captain Guest: I am aware of the general organisation of the Air Service in France, but the methods adopted there are not altogether applicable to a country which depends on voluntary enlistment and not on conscription. I

am glad to say that the scheme of organisation of our Air Force Reserve is complete, and the Regulations will be promulgated shortly. A commencement of the manning of it will be made this year with the short service officers who will be passing to the reserve on the completion of their period on the active list. I am not in a position as yet to give the numbers asked for.

Enemy Air Raids Compensation

SIR F. FLANNERY asked the Financial Secretary to the Treasury the period within which the £100,000 allocated to be used for compensation to the sufferers from air raids during the War in the most necessitous cases will be distributed; and whether the case of Mr. Robert Pilgrim, nurseryman, of Braintree, Essex, whose premises were destroyed six years ago in an air raid, can now be favourably considered, the application having been made by Mr. Pilgrim to the Board of Trade Department shortly after injury and again on 20th May, 1920, in accordance with the promise made to this House by the Prime Minister that all suffering by air raids would be compensated?

Mr. Young: The sum of £100,000 is the estimated amount required to meet awards by the Royal Commission, presided over by Lord Sumner, up to March 31, and a further sum of £4,900,000 is being provided for 1922-23. Individual cases are a matter for the Royal Commission.

Aeroplane Squadrons

MR. RAPER, on March 16, asked the Secretary of State for Air how many effective squadrons of aeroplanes are owned by, respectively, Great Britain and France, stating how many effective machines and pilots are calculated per squadron; and, so far as Great Britain is concerned, how many of these effective squadrons are at present stationed in this country for home defence?

Captain Guest: As regards the first part of the question, the differences in organisation of the Air Services of Great Britain and France make it impossible to supply, within the limits of a parliamentary answer, comparative figures which would be of any value. The present strength of the Royal Air Force, in terms of active units, is 32 squadrons, of which the number stationed in England for all purposes is 12. I would ask the hon. Member to wait for my speech on Air Force Estimates, in which I hope to be able to deal briefly with the question of home defence.

Ex-Pilots

MR. RAPER asked the Secretary of State for Air if he can now see his way to grant to ex-Air Force pilots the same facilities as are accorded both in France and the United States to enable those who desire keeping in practice, so far as the actual flying of machines is concerned, thereby maintaining at a minimum expense a most useful type of Reserve?

Captain Guest: The regulations for the Air Force Reserve, when they become operative, will provide for periodical flying practice by officers belonging to it. But, as my hon. friend has previously been informed, I do not think that provision from public funds of free facilities for flying could be justified in the case of persons who have no Reserve liability.

RADIOLOGICAL RESEARCH

By Dr. V. E. PULLIN, Director of Radiological Research, Royal Arsenal, Woolwich.

THE paper under above title, read by Dr. Pullin on March 16 before the Royal Aeronautical Society, was one of unusual interest, dealing as it did with a subject which has not yet received in the aviation world the attention which it appears to deserve. Lieut.-Col. O'Gorman was in the chair, and after introducing the lecturer called upon him to read his paper. As a great part of the paper was in the nature of an explanation of the lantern slides shown, of which there were about 50, it is impossible for us to report this section of the lecture. The following synopsis of the introductory remarks may, however, help to give those not intimately acquainted with the subject a general idea of the problems involved and of the apparatus used in radiological research.

The object of the lecture, Dr. Pullin stated, is to show the present position of radiology with regard to its usefulness in affording a means of inspection of various materials, and more especially the materials and parts used in aeroplane construction. At the present time a good deal is written about X-rays, and those who are working on the subject have to combat two extreme points of view: on the one hand, the popular idea that X-rays can penetrate anything, and, on the other, the idea that the whole subject is all very well as a laboratory piece of apparatus—in other words, a toy, but of no value whatever to the practical man.

The lecturer said he wanted to show exactly what X-rays are capable of doing now, what modern apparatus and technique can achieve, and also what the limitations are and how far it will be possible for research to overcome them within a reasonable time. In the first place, he gave a general sketch of the activities of the Radiological Laboratory in the Research Department at Woolwich. The whole idea of radiological research there is to apply radiology as far as possible in every direction to the needs of the fighting services. The Department is not concerned at all with pure research for its own sake, and only undertakes such problems when they form a very definite means towards a practical Service end.

The apparatus required for inspection purposes, which form one of the main directions of work of this Laboratory, are as follows:—(1) An X-ray tube capable of a heavy output of rays and designed to run for long periods. (2) A convenient high-tension electrical transformer with a suitable rectifying device. For general inspection or factory use, the installation should be portable, and, perhaps most important of all, the whole apparatus must be absolutely safe both as regards X-ray and electrical dangers. Such a set, to have a maximum value, must also possess a simplicity of control in order that it may be put into the hands of comparatively unskilled workers.

Dr. Pullin stated that he did not propose to discuss in any way the physics of X-rays, but would merely refer to what are the essential pieces of apparatus required: a source of high-tension uni-directional current, an X-ray tube, protection for the operator, and also a method of registering the rays after passing through the specimen. For our present purpose we need consider only the high-tension transformer as a source of high-tension current, and as it may be taken generally that the penetrating power of the X-rays produced depends entirely on the voltage which is applied to the tube, it is clear that transformer design affords a very large field for research in general radiology.

For example, a transformer designed to give an (R.M.S.) voltage of 150,000 should, all other things being equal, enable us to penetrate three inches of steel, and with modern technique should enable us to detect a flaw of about $\frac{1}{16}$ th of an inch. The current required for the operation of an X-ray tube must be uni-directional. It is therefore necessary to provide a device which shall rectify the alternating current delivered by the transformer. Here again is another subject for research.

The next and most important piece of apparatus is, of course, the X-ray tube itself, and if the lecturer had the time it would be possible, he said, to say quite a lot on this subject. He only proposed to ask the audience to remember that the best type of tube for the work under consideration is that which is known as the hot cathode type, in which the production of X-rays depends upon the emission of electrons from an incandescent filament. The great advantage of such a tube is that it is capable of very accurate control, and it is more or less consistent in its performance. The next point for consideration in an X-ray installation for inspection work is that of protection for the operator and workers from X-ray and allied dangers. In addition to the

danger of shocks, the presence of high-tension electricity in the atmosphere is associated with certain obscure physiological conditions which may prove very harmful. It is therefore essential that all high-tension apparatus should be carefully protected, and, further, that any room in which an X-ray installation is continually operated should be thoroughly well ventilated.

Regarding the dangers due to X-rays, these are of the greatest importance, because the physiological effect of the ray is not by any means understood. It is known that one type of X-radiation produces skin disease which does sometimes manifest itself in a severe form, but, fortunately, this particular form of radiation may be eliminated by a suitable system of screening. There is another type of radiation which is produced at the same time which will penetrate a considerable thickness of almost any protective material, and it is probable that these rays have a much more serious physiological effect, probably on the blood and deeper tissues. The problem is, then, to provide protection for the operator from the whole of this radiation.

The next item on the list of apparatus is, perhaps, one of the most important from the point of view of the practical man. It is the method of registering the rays. It is not necessary to refer here to the photographic method, which, although valuable when examining certain of the heavier specimens, does not apply when considering the question of routine examination, which has proved of so much service in aircraft construction. In this respect we need only consider the fluorescent screen, which forms a means of rapid visual examination. The visual examination depends, roughly, on three factors:—(1) the screen itself, (2) the optical arrangement of the installation, (3) the physiological characteristics of the observer.

The choice of screen is important. X-ray screens in general are made of a coating of granular fluorescent substance on a card or other material.

The fluorescent substance generally used is platino-cyanide of barium. Another cheaper but efficient type of screen is now made which is coated with a different fluorescent material, and is known commercially as a white salt screen. The points about the choice of screen for this work are: (1) luminosity under the influence of the rays, (2) contrast, (3) granularity, (4) fatigue.

Fluorescent screens vary considerably on each of these points. For instance, with regard to luminosity, a difference of as much as 25 per cent. was observed between one commercial screen and another. With regard to a comparison between the two types of screen referred to, there is very little to choose. Perhaps in general a platinum screen is superior, but this is more than compensated for by the far smaller cost of the white salt screen. The construction of the optical arrangements is important. Examination should always be made indirectly—that is, by means of a mirror. All light should be excluded as far as possible, as the presence of stray light detracts enormously from the efficiency of observation.

The physiological characteristics of the observer vary considerably. One man may prove to be an excellent observer, while another may fail almost entirely to appreciate fine detail. The eye may to a certain extent be rendered more sensitive by remaining for about five to ten minutes in the dark, but, of course, visual acuity varies considerably in different people. A good observer must possess an acute sense of contrast in illumination. It is a well-known fact that it is much easier to appreciate such contrast when illumination is brilliant than when it is feeble. Consequently we must aim at brilliant illumination of the screen, but this means a heavy current through the X-ray tube, and at the present time really brilliant illumination of the screen is not possible when examining metal structures.

The research is proceeding along the lines indicated, and progress in every direction is to be looked for, but at the same time the use of X-rays at the present state of development is certainly not properly appreciated. This applies more especially to those who are engaged in manufacture and inspection of aircraft, which by reason of the lightness of the parts renders the radiological examination comparatively simple; the one important essential is that skilled attention shall be devoted to suitable design of the installation.

Another point of noteworthy importance is that radiological examination is absolutely reliable. The enormous importance that attaches to the security, workmanship and

materials of an aeroplane—a matter always of life and death—demands that no method of inspection which adds or may add so much to the security of the structure as a whole can be ignored without the fullest possible investigation.

Slides were then shown illustrating general radiological inspection work.

The majority of these were radiographs of objects not connected with aircraft construction, although some illustrated well-known aeroplane components. One slide showed an aeroplane spar with internal cross-grain which was not visible externally; others illustrated what appeared to be defects in welding elevator and aileron king posts. The most glaring example was, however, furnished by a slide showing a radiograph of a control lever in which the end of the pivoted portion was not pushed sufficiently far into the main tube, the two pins which were intended to secure the two parts to one another passing through the main tube only. A quantity of solder at the outer end was all that kept the control tube attached to its swivelling base. Had this control tube been mounted in the machine an accident would almost certainly have happened.

The Discussion

THE Chairman, Lieut.-Col. O'Gorman, said that some seven years ago he visited a large French aircraft factory not far from Paris, and he discovered that this establishment had a radiological research department. This was, however, of a very dangerous nature, he was told, and he was not allowed to see very much of it. Great satisfaction was expressed with the work which could be carried out, although apparently the only defect which had ever been discovered by the aid of radiological examination was a small crack in a certain component. As this crack was easily visible by ordinary inspection, the value of the installation seemed somewhat doubtful. He hoped that modern work was of more value. He then asked the audience to consider the paper open for discussion.

Col. Briggs thought that, as metal construction is now coming to the fore, any means which would enable one to detect flaws was of importance, and especially for metal propellers, where there was a great deal of welding, radiological inspection might be of considerable help. He thought that the A.I.D. might make more use of it, and wanted to know if it would be possible to have a portable plant which could be used by the A.I.D., and how much such a plant would cost.

Mr. Manning said that he had watched with great interest the various slides, and noted the dark spots and light spots, but he was somewhat at a loss to interpret the radiographs,

and would like more information regarding the manner in which an inspector could interpret the information conveyed by the radiograph.

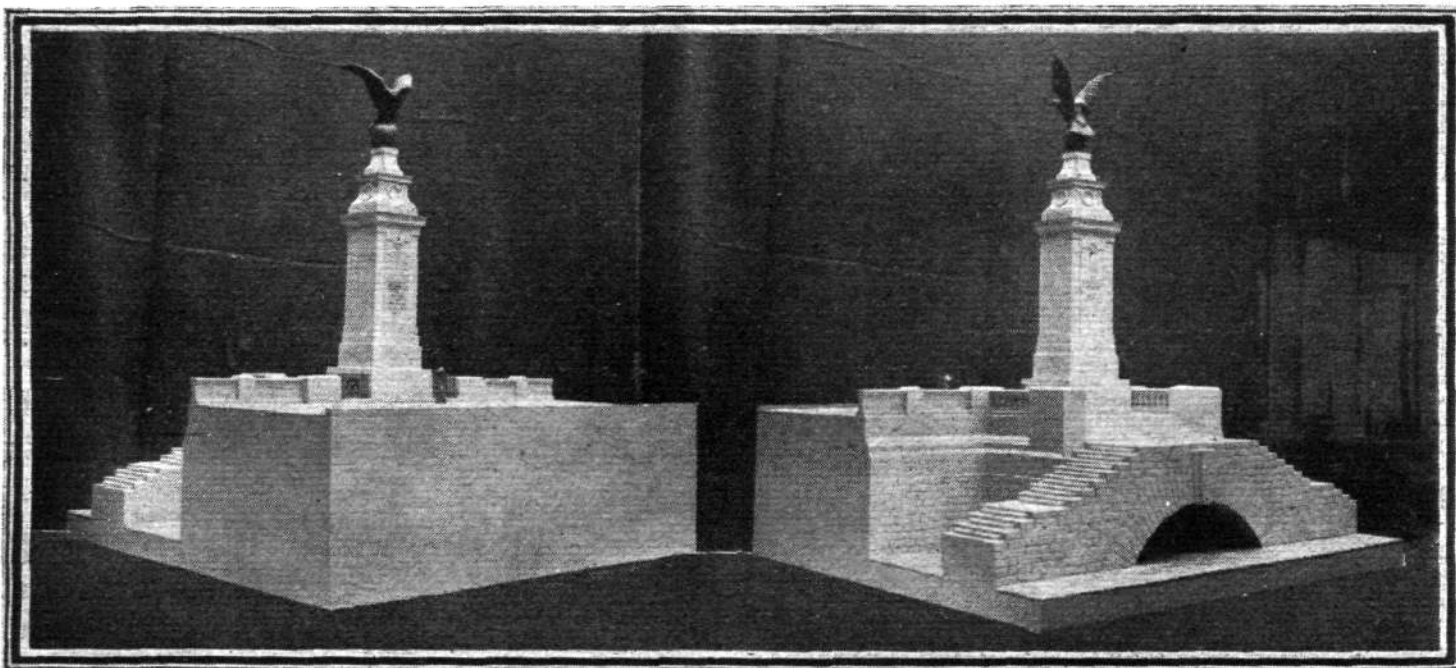
One member of the audience, whose name we failed to catch, asked if it was usual, during inspection, to turn the specimen over for examination, so that a defect which in one view appeared as a hole might be revealed in another position as a line or crack.

Mr. Kaye, of the N.P.L., stated that the A.I.D. already had an apparatus at the N.P.L., and that a certain amount of work had been carried out. He thought, however, that we still had a long way to go before we could popularise X-ray inspection. The work was often laborious, and the workers must be allowed to do the work in their own way and immediate results not expected. He expressed the hope that the Geddes Committee would be sympathetic to this kind of research work.

Mr. Bowden said he could see one way in which radiology could be the means of saving an enormous amount of money. If it were possible to increase the penetration to about 6 ins., so that ingots of this size could be examined, he thought there was an enormous future for X-ray work. He understood that, in the case of a ship, the power curve increased as the cube of the speed. He hoped that the curve representing the penetration of X-rays, on a basis of voltage, would not be found to increase in a similar manner, so that to increase the penetration from 3 to 6 ins. would mean impracticable voltages.

Col. O'Gorman said he was not so critical as some of the speakers, but thought that radiology might be found to be a great help in aircraft construction. For one thing, if, as he was not quite convinced, radiography did show defective welding, it would be of the very greatest value. Welding might then come back into aircraft construction, since good welding was extremely satisfactory in aircraft. It was the bad weld which was dangerous, and at present we had no means of detecting the bad weld, with the consequence that welding had to be abandoned for stressed parts. When, he said, two pieces of 25-ton steel were welded together it was often found that, as a result of the heat, the metal near the weld had its strength decreased to about 10 tons. If radiology could detect this change in the structure of the steel it would be of enormous value, and we, as aircraft engineers, should welcome any weapons which would enable us to make our structures more safe without making them heavier. He then called upon the audience to pass a hearty vote of thanks to the lecturer.

Dr. Pullin had another appointment, and asked to be allowed to reply to the various questions in writing.



Model of the R.A.F. War Memorial to be erected at the head of the Whitehall Stairs, on the Embankment, about midway between Charing Cross and Westminster Bridges. The Memorial has been designed by Sir Reginald Blomfield, R.A., and the eagle is being carried out from his design by Mr. Reid Dick, A.R.A.

The Memorial, as will be seen, consists of a lofty pylon of Portland stone, supporting a large bronze eagle encircled by the Zodiac. The dedication inscription will be cut on the panel facing the Embankment, with the badge of the Air Force above it, and on the band of stone below the cornice the motto of the Air Force, "Per ardua ad astra." A shorter inscription in larger letters, and the Pilots' Badge, will be carved on the side facing the river.

THE ROYAL AIR FORCE

London Gazette, March 7, 1922

General Duties Branch

Flying Officer R. de L. Stedman is granted a permanent commn., retaining his present substantive rank and seny.; Dec. 12, 1919 (*Gazette* Dec. 12, 1919, appointing him to a short service commn. is cancelled).

The following are granted short service commns. as Flying Officers, with effect from and seny. of dates indicated:—W. F. Hamilton; Feb. 23. C. A. Mason; Feb. 22.

The following Flight Lieuts. are restored to full pay from half pay:—C. P. O. Bartlett, D.S.C., Feb. 24; G. E. Wilson, Feb. 24.

Stores Branch

Flying Officer H. N. Stevens is granted a permanent commn., retaining his present substantive rank and seny.; June 17, 1920.

Memoranda

Capt. G. H. Warner relinquishes his temp. commn. on ceasing to be employed, and is permitted to retain his rank; Feb. 15. Lieut. (acting Capt.) A. E. N. Fortescue, M.B.E., relinquishes his temp. commn., and is permitted to retain rank of Capt.; Feb. 17. Sec. Lieut. (Hon. Lieut.) A. Duthie is transfd. to the unemployed list; May 10, 1919 (substd. for *Gazette* May 20, 1919).

London Gazette, March 10, 1922

Air Vice-Marshal Sir W. G. H. Salmond, K.C.M.G., C.B., D.S.O., is appointed Director-General of Supply and Research, Air Ministry, vice Air Vice-Marshal Sir E. L. Ellington, K.C.B., C.M.G., C.B.E.; February 23.

General Duties Branch

Flying Officer P. N. Melitus is granted the hon. rank of Flight-Lieut. on promotion to Capt. in Royal Warwick Regiment; January 15. Flight-Lieut. C. E. Wardle to take rank and precedence as if his name appeared in the Air Force List immediately below that of Flight-Lieut. W. S. Caster, M.C. Reduction to take effect from February 2. Flying Officer T. H. Moon is placed on h.p. Scale B; February 25. *Gazette*, August 10, 1920, concerning Flying Officer A. C. Sanderson, D.F.C., is cancelled.

Memoranda

Three Cadets are granted hon. Commns. as Sec. Lieuts., with effect from the dates of their demobilisation.

Permission granted to the following officers to retain rank of Sec. Lieut. is withdrawn on their joining the Army:—W. R. Wright, J. T. R. Wynn; January 19, 1921.

Gazette, February 28, 1919, concerning Sec. Lieut. (Hon. Major) G. A. E. Chapman, is cancelled.

London Gazette, March 14, 1922

General Duties Branch

Flying Offr. C. S. Gray is placed on the Retd. list on account of ill-health contracted on active service; March 15. Squadn. Leader E. L. Conran, M.C., is placed on half-pay, Scale B (from Feb. 14 to April 12 inclusive).

Stores Branch

Flying Offr. V. G. A. Bennett is granted permanent commn., in the rank stated, with effect from Sept. 12, 1919, and is transferred to the Stores Branch for accountant duties, with effect from Feb. 1; *Gazette* Sept. 12, 1919, appointing him to a short service commn. is cancelled. Flying Offr. (actg. Fit. Lieut.) H. F. Fuller is granted a permanent commn. as a Fit. Lieut. for accountant duties; Oct. 25, 1921. The seniority of all officers granted commns. in the Stores Branch for accountant duties is provisional only. The final seniority list of all such officers will be promulgated when the establishment is completed.

Memorandum

Lieut. G. A. Denty relinquishes his temp. commn. on ceasing to be empld., and is permitted to retain his rank; Feb. 23.

London Gazette, March 17, 1922

General Duties Branch

The follg. Pilot Offrs. on probn. are confirmed in rank:—J. G. Shackleton; March 5. C. E. B. Winch; March 7.

The follg. Flying Offrs. are placed on h.p., Scale B:—E. Burton; March 11. V. Croome; March 10.

Flying Offr. W. A. Berry is granted hon. rank of Flight Lieut. on promotion to Capt., 4th D.G.; Sept. 17, 1921.

Memoranda

Three Cadets are granted hon. commns. as Sec. Lieuts., with effect from dates of their demobilisation.

ROYAL AIR FORCE INTELLIGENCE

Appointments.—The following appointments in the Royal Air Force are notified:—

Air Vice-Marshal J. F. A. Higgins, C.B., D.S.O., A.F.C., from Headquarters Inland Area (on ceasing to be attached to the Air Ministry) to R.A.F. Depôt (Inland Area) (Supernumerary.) Whilst attending R.N. Staff College for Senior Officers' War Course. 7.3.22.

Group Capt. I. M. Bonham-Carter, O.B.E., from No. 11 (Irish) Wing to Headquarters, R.A.F., Ireland. 17.2.22.

Wing Commander G. F. Prettyman, D.S.O., O.B.E., from R.A.F. Depôt (Inland Area), to command No. 11 Wing Headquarters (Inland Area). 1.3.22.

Wing Commander N. J. Gill, C.B.E., M.C., from R.A.F. Depôt (Inland Area) to command Aeroplane Experimental Establishment (Coastal Area). 1.3.22.

Wing Commander A. V. Bettington, C.M.G., from Headquarters, No. 11 (Irish) Wing to R.A.F. Depôt (Inland Area). 17.2.22.

Wing Commander N. Goldsmith, O.B.E., from Aircraft Depôt, Egypt (Middle East Area) to command M.T. Repair Depôt (Inland Area). 13.2.22.

Squadron Leaders.—G. H. Bowman, D.S.O., D.F.C., from R.A.F. Depôt (Inland Area) to command No. 8 Squadron (Iraq Group). 24.2.22. W. S. Douglas, M.C., D.F.C., from No. 6 Flying Training School (Inland Area) to R.A.F. Staff College (Inland Area). 3.4.22. C. W. H. Pulford, O.B.E., A.F.C., from R.A.F. Base, Gosport (Development Flight) (Coastal Area) to R.A.F. Staff College (Inland Area). 3.4.22. C. F. A. Portal, D.S.O., M.C., from R.A.F. Cadet College (Flying Wings) (Cranwell) to R.A.F. Staff College (Inland Area). 3.4.22. B. E. Smythies, D.F.C., from No. 3 Flying Training School (Inland Area) to R.A.F. Staff College (Inland Area). 3.4.22. W. A. McClaughry, D.S.O., M.C., D.F.C., from Air Pilotage School (Cadre) (Inland Area) to R.A.F. Staff College (Inland Area). 3.4.22. L. L. Maclean from No. 2 Flying Training School (Inland Area) to R.A.F. Staff College (Inland Area). 3.4.22. K. R. Park, M.C., D.F.C., from School of Technical Training (Men) (Inland Area) to R.A.F. Staff College (Inland Area). 3.4.22. J. T. Babington, D.S.O., from No. 6 Flying Training School (Inland Area) to R.A.F. Depôt (Inland Area). 3.4.22. J. V. Steel, O.B.E., from R.A.F. Depôt (Inland Area) to School of Technical Training (Men) (Inland Area). 20.3.22. G. F. Breese, D.S.C., from No. 238 Squadron (Cadre) (Coastal Area) to R.A.F. Depôt (Inland Area). 14.3.22. J. C. M. Lowe from Air Ministry (Director-General of Supply and Research) to Air Ministry (Directorate of Operations and Intelligence). 6.3.22. G. Blatherwick from Central Flying School (Inland Area) to School of Photography (Inland Area). Supernumerary. 3.4.22. T. W. Elsdon, from No. 29 Group Headquarters (Coastal Area) to R.A.F. Depôt (Inland Area). (Supernumerary.) 6.2.22. D. Harries, A.F.C., from R.A.F. Airship Base (Coastal Area) to Headquarters (Coastal Area). (Supernumerary.) Pending closing down of R.A.F. Airship Base. 24.2.22. H. C. Fuller, from R.A.F. Airship Base (Coastal Area) to Headquarters (Coastal Area). (Supernumerary.) To remain attached to Pulham Airship Station. 24.2.22. P. Babington, M.C., A.F.C., from Egyptian Group Headquarters (Middle East Area) to R.A.F. Depôt (Inland Area). (Supernumerary.) 3.3.22.

Flight Lieutenants.—H. E. Flavell from R.A.F. Depôt (Inland Area) to Headquarters No. 1 School of Technical Training (Boys) (Halton). 22.2.22. J. W. Woodhouse, D.S.O., M.C., from No. 1 Flying Training School (Inland Area) to Central Flying School (Inland Area). 13.3.22. A. Lees from No. 6 Flying Training School (Inland Area) to Central Flying School (Inland Area). 13.3.22. J. K. Summers, M.C., from No. 5 Flying Training School (Inland Area) to Central Flying School (Inland Area). 13.3.22. B. McEntegart from No. 2 Flying Training School (Inland Area) to Central Flying School (Inland Area). 13.3.22. H. G. Bowen from R. A. F. Depôt (Inland Area) to Central Flying School (Inland Area). 13.3.22. J. J. Williamson, A.F.C., from No. 100 Squadron (No. 11 (Irish) Wing) to Central Flying School (Inland Area). 13.3.22. T. M. Walker from Research Laboratory and Medical Officers School of Instruction (Inland Area) to Headquarters No. 1 School of Technical Training (Boys) (Halton). 27.2.22. A. C. Ransford, from Research Laboratory and Medical Officers School of Instruction (Inland Area) to R.A.F. Depôt (Inland Area). 27.2.22. A. C. Snow, from R.A.F. School (India) to R.A.F. Depôt (Inland Area). 31.1.22. L. N. Hollinghurst,

D.F.C., from No. 5 Squadron (India) to R.A.F. Depôt (Inland Area). 31.1.22. D. A. Stewart, M.C., D.F.C., A.F.C., from No. 216 Squadron (Middle East Area) to R.A.F. Depôt (Inland Area). 13.2.22. F. G. M. Williams from R.A.F. Depôt (Inland Area) to No. 10 Group Headquarters (Coastal Area). 1.3.22. H. McWilliams Daniel, M.B., from R.A.F. (Inland Area) to No. 1 School of Technical Training (Boys) (Halton). 3.3.22. J. H. O. Jones from R.A.F. Base, Gosport (No. 210 Squadron) (Coastal Area) to R.A.F. Base, Gosport (Observers' Training Flight) (Coastal Area). 1.3.22. O. C. Bryson M.C., A.F.C., A.M., from R.A.F. Base, Gosport (Observers' Training Flight) (Coastal Area) to R.A.F. Base, Gosport (No. 210 Squadron) (Coastal Area). 1.3.22. G. E. Wilson from Half-pay List to No. 4 Flying Training School (Middle East Area). 24.2.22. E. S. Goodwin, A.F.C., from Marine and Armament Experimental Establishment (Coastal Area) to No. 216 Squadron (Middle East Area). 24.2.22. A. Coningham, D.S.O., M.C., D.F.C., from Central Flying School (Inland Area) to No. 55 Squadron (Iraq Group). 24.2.22. C. P. O. Bartlett, D.S.C., from Half-pay List to No. 30 Squadron (Iraq Group). 24.2.22. H. M. Massey, M.C., from No. 39 Squadron (Inland Area) to No. 8 Squadron (Iraq Group). 24.2.22. F. N. Hudson, M.C., from R.A.F. Cadet College (Flying Wing) (Cranwell) to No. 6 Squadron (Iraq Group). 24.2.22. R. A. Courtney, M.B.E., from No. 11 Wing Headquarters (Inland Area) to Headquarters (Iraq Group). 24.2.22. J. H. D'Albiac, D.S.O., from No. 4 Flying Training School (Middle East Area) to No. 47 Squadron (Middle East Area). 13.2.22. F. R. Alford, M.C., from No. 10 Group Headquarters (Coastal Area) to Armament and Gunnery School (Cadre) (Inland Area). 6.3.22. H. S. Shields, M.C., from No. 208 Squadron (Middle East Area) to R.A.F. Depôt (Inland Area) (Supernumerary). 8.2.22. W. R. Reith, M.D., A.M., from No. 1 School of Technical Training (Boys) (Halton) to R.A.F. Depôt (Inland Area). For duty as Medical Officer. 7.3.22. R. E. H. Daniel from Air Ministry (Directorate of Training and Organisation) to R.A.F. Depot (Inland Area) (Supernumerary). 5.3.22. E. B. C. Betts, D.S.C., D.F.C., from R.A.F. Depôt (Inland Area) to R.A.F. Staff College (Inland Area). 3.4.22. E. B. C. Betts, D.S.C., D.F.C., from H.M.S. "Pegasus" (Mediterranean Group) to R.A.F. Depôt (Inland Area) (Supernumerary). 28.2.22. G. H. White from No. 1 School of Technical Training (Boys) (Halton) to No. 4 Squadron (Inland Area). 15.3.22. D. H. Dabbs from No. 3 Flying Training School (Inland Area) to No. 4 Flying Training School (Middle East Area). 21.1.22. G. C. Pirie, M.C., D.F.C., from R.A.F. Depôt (Inland Area) to School of Army Co-operation (Inland Area). 10.3.22. J. B. Cole-Hamilton from Boys' Wing (Cranwell) to R.A.F. Staff College (Inland Area). 3.4.22. G. M. Lawson, M.C., from Armament and Gunnery School (Cadre) (Inland Area) to R.A.F. Staff College (Inland Area). 3.4.22. H. S. Kerby, D.S.C., A.P.C., from No. 1 School of Technical Training (Boys) (Halton) to R.A.F. Staff College (Inland Area). 3.4.22. W. B. Farrington, D.S.O., from Headquarters, R.A.F., Cranwell, to R.A.F. Staff College (Inland Area). 3.4.22. W. R. Dyke Acland, D.F.C., A.F.C., from H.M.S. "Argus" (Coastal Area) to R.A.F. Staff College (Inland Area). 3.4.22. C. H. Hayward from R.A.F. Depôt (Inland Area) to R.A.F. Staff College (Inland Area). 3.4.22. N. W. Wadham from R.A.F. Base, Leuchars (Coastal Area) to R.A.F. Staff College (Inland Area). 3.4.22. R. M. Drummond, D.S.O., M.C., from School of Army Co-operation (Inland Area) to R.A.F. Staff College (Inland Area). 3.4.22. E. B. Beauman from No. 10 Group Hdqrs. (Coastal Area) to R.A.F. Staff College (Inland Area). 3.4.22. H. S. Powell, M.C., from No. 11 Wing Hdqrs. (Inland Area) from R.A.F. Staff Col. (Inland Area). 3.4.22. H. H. McLeod Fraser, from Central Flying School (Inland Area) to School of Photography (Inland Area). (Supernumerary.) 3.4.22. D. W. Clappen, from Central Flying School (Inland Area) to School of Photography (Inland Area). (Supernumerary.) 3.4.22. E. N. E. Waldron, from Central Pay Office (Inland Area) to No. 4 Stores Depôt. 20.3.22. A. L. Neale, M.C., from R.A.F. Depôt (Inland Area) to No. 39 Squadron (Inland Area). 15.3.22. R. J. O. Compston, D.S.C., D.F.C., from R.A.F. Depôt (Inland Area) to No. 1 School of Technical Training (Boys) (Halton). 15.3.22. T. L. P. Harries, M.B., from R.A.F. Depôt (Inland Area) to No. 1 Flying Training School (Inland Area). 8.3.22. R. M. King, from R.A.F. Depôt (Inland Area). On attachment to Royal Air Force from Army Dental Corps. 21.2.22. A. Briscoe, M.B., from No. 20 Squadron (India) to No. 28 Squadron (India). 16.10.21.

SIDE-WINDS

IN view of the very great importance to modern aviation of reliable instruments of all kinds, it is not surprising that this part of the equipment of aircraft should come in for a good deal of study. As an instance, mention may be made of the fact that on March 13 a party of students from the Royal College of Science and Technology paid a visit to the Cricklewood works of Messrs. S. Smith and Sons (M.A.) Ltd.

THEY were particularly interested in the calibrating department, where airspeed indicators, pressure gauges, petrol level indicators, revolution counters and altimeters are calibrated and tested. They were shown the special overload test on the Smith pressure gauges, whereby the ordinary 5 lb. gauge is subjected to a pressure of 20 lbs., and a 100 lb. gauge to a pressure of over 300 lbs. before it is finally accepted for shipment to the customer. They were also interested in some special airspeed indicators which have been made up for the new Handley Page London-Paris machines, for fitment in the passenger cabins. Both the altimeter, airspeed indicator and clock are arranged with highly polished bezels and silvered dials, which harmonise with the general arrangement of the cabin and have a more artistic appearance than the standard pattern of black instruments. Besides visiting the aviation section of the works the party made a general tour of inspection of the various machine and assembly shops, the stores and despatch department, canteen and recreation rooms, dance hall, etc.

WE have received from the Bristol Aeroplane Co., Ltd., copies of an interesting little booklet dealing with their gas starter for aero engines. This starter, which was described in *FLIGHT* on December 1, 1921, is suitable for engines having six or more cylinders, and a cubic capacity up to 2,500 cubic ins. A feature of the starter is that, as there are no gears between the starter and the engine, the starter may be installed in any convenient place within 20 ft. of the engine. The weight of the unit is only 46 lbs. The booklet gives a very clear illustrated description of the starter and its method of working, and we should recommend all interested in the subject of engine starters to obtain a copy. Finally, it might be mentioned that the price of the starter is £85 delivered at the Filton works. This figure does not include the cost of the distributor, which varies according to the type of engine.

THERE was a time, and looking back it does not seem very long ago, when the running of an aero engine was a delicate business. The engines required very careful attention, and even then they had to be dismantled and overhauled after very short periods in the air. The modern aero-engine is quite a different proposition in this respect, and by way of an example it may be mentioned that quite recently a Napier "Lion" used on the London-Paris services completed 20,000 miles without having been taken down. This is striking testimony to the manner in which these engines stand up to their work, and is, of course, mainly due to the fact that their weight is so low in relation to the power developed that they can be run normally at about 60 per cent. of their power and still give the machines sufficient cruising speed.

WE learn from Barimar, Ltd., of 10, Poland Street, W. 1, that they are not involved in the present engineering dispute, and that, therefore, there is no ban on the employment of Barimar experts. Mr. C. W. Brett informs us that welding work is plentiful, and is being carried on as usual.

R.A.F. Club.

THE following arrangements have been made by the Committee for the two forthcoming dances at the R.A.F.C.:

Thursday, March 23, 9.30 to 2.30. Tickets, 10s. 6d. Dinner served from 8 p.m.; 5s.

Thursday, April 6, 9 to 1. Tickets, 7s. 6d. Dinner from 7.30 p.m.

The number of dance tickets will be limited in each case to 200.

Members desiring to reserve tables should make application to the Steward. Music will be provided by the Kendal Grimston Quintette.

The small dining-room will be set aside between 7 and 8 p.m. for members desiring to dine in the Club who do not wish to dine in the large dining-room. The large dining-room will be opened to members wishing to dine lady guests, but the number of tables will be limited to admit of members dining in the dining-room also.

THE LONDON AERO-MODELS ASSOCIATION

COMPETITION No. 2 for R.O.G. Duration for prizes given by Mr. Louch and Mr. Wilson. First, £1 1s.; second, 10s. To be held on Wormwood Scrubbs on Sunday, April 16, at 11 a.m. Models limited to 4 ozs. in weight; no other restrictions. Judges, Mr. Wilson and Mr. Gray.

Competition No. 3 for R.O.G. Duration, limited to enclosed models weighing not less than 8 ozs., any power. Loading limit (minimum), 6 ozs. to the sq. ft. for monoplanes and 5 ozs. per sq. ft. for biplanes. To take place on Wimbledon Common at 11 a.m., start 11.15 a.m., May 7. Flights timed from release of propellers. Prizes given by Messrs. W. G. Evans and Sons: first, 25s.; second, 10s.; third, 7s. At least two flights per competitor. Judges to be appointed later.

Competition No. 4. Prize given by Mr. D. A. Pavely, value 10s., awarded to member who first makes duration of 60 secs. R.O.G. with enclosed model. Will members take special notice of Competition Rules Nos. 1 and 3?

S.E. Section

Report by Official Observer (Mr. L. G. H. Hatfull) as follows: A meeting of the above Section was held at Blackheath at 8 a.m. on Sunday, March 12. Messrs. Brown, Rippon, Wilson, Cummings and Hatfull attended. Mr. Scott was also present. All were flying tractor models, and a very interesting exhibition took place. At 9.30 an impromptu "Aerial Derby" was held, Mr. Wilson winning with 15 flights. The course was triangular, bases being about 250 yds. apart. An enjoyable competition was concluded in under half an hour. Conditions were very favourable, there being very little wind. The meeting closed at 10 a.m. Competition Secretary, Mr. C. A. Rippon, 52, Fairbridge Road, Holloway, N.19. Hon. Sec., A. E. Jones, 48, Narcissus Road, N.W. 6. Meetings held every Thursday evening at General Headquarters, 20, Great Windmill Street, Piccadilly Circus, W. 1, at 7.30.

AERONAUTICAL PATENT SPECIFICATIONS

Abbreviations: cyl. = cylinder; I.C. = internal combustion; m. = motors. The numbers in brackets are those under which the Specifications will be printed and abridged, etc.

APPLIED FOR IN 1920

Published March 23, 1922

- 31,568. J. V. MARTIN. Landing-wheels for aircraft. (175,706.)
32,455. J. F. H. DE V. VANDELDE. Aeroplane control mechanism. (154,897.)
33,406. G. L. AND D. A. SAUNDERS. Inclino-meters. (175,771.)
33,689. E. R. CATHROP. Parachutes. (175,780.)
34,230. C. R. FREEMANTLE. Wind-screens. (175,798.)

APPLIED FOR IN 1921

Published March 23, 1922

- 11,350. J. H. W. GILL. Screw propellers. (175,922.)
19,399. LUTFSCHIFFBAU ZEPPELIN GES. and P. JARAY. Gas valves for lighter-than-air aircraft. (167,749.)

If you require anything pertaining to aviation, study "FLIGHT's" Buyers' Guide and Trade Directory, which appears in our advertisement pages each week (see pages iii and xiv).

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